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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/772,949	01/31/2001	Wayne J. Howell	BU99-175DIV	1476

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FREDERICK W. GIBB, III
MCGINN & GIBB, PLLC
2568-A RIVA ROAD
SUITE 304
ANNAPOLIS, MD 21401

EXAMINER

GRAYBILL, DAVID E

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 07/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/772,949

Applicant(s)

HOWELL ET AL.

Examiner

David E Graybill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 29 April 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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The following is a quotation of the first paragraph of 35

U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 23-28 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The undescribed subject matter is the limitations directed to the species.

Claims 23-28 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The undescribed subject matter is the limitations directed to the species.

The following is a quotation of the second paragraph of 35

U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 21 and 23-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 21 the limitation "such that said second plug is in direct contact with said connector" appears to be incompatible with the claim 20 limitation "wherein said connector is formed to be in direct contact with said plug."

In claim 23 the scope of the term "species" is unclear because the claim does not recite the particular property that defines the species, and the property cannot otherwise be determined.

In claim 23 it is unclear if or how the term "a given" further modifies the scope of the term "species." Therefore, one of ordinary skill in the art would not be reasonably apprised of the scope of the claim.

In claim 27 the scope of the term "Tan" is unclear because there is no art recognized definition of the term, and it is not otherwise explicitly defined in the disclosure.

Claim 21 has not been rejected over the prior art because, in light of the 35 U.S.C. 112 rejection supra, there is a great deal of confusion and uncertainty as to the proper interpretation of the limitation of the claim; hence, it would

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not be proper to reject the claim on the basis of prior art. As stated in *In re Steele*, 305 F.2d 859, 134 USPQ 292 (CCPA 1962), a rejection should not be based on considerable speculation about the meaning of terms employed in a claim or assumptions that must be made as to the scope of the claims. See also MPEP 2173.06.

In the rejections *infra*, reference labels are generally recited only for the first recitation of identical claim language.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 17, 18, 20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Kumar (5290732).

At column 5, line 26 to column 6, line 13, Kumar teaches the following:

20. A method of forming an integrated circuit structure comprising: forming a via through an exterior 16a of said integrated circuit structure to internal components 14a of said integrated circuit structure; lining said via with a barrier

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layer 18a; forming a plug 40 above said barrier layer, said plug and said internal components comprising a same material ["aluminum"]; and forming a solder ball connector 44 on said plug, wherein said connector is formed to be in direct contact with said plug.

22. The method in 20, wherein said solder ball connector is comprised of a lead/tin alloy.

17. The method in 20, wherein said barrier layer comprises one or more layers of Ti, TiN, Ta, and TaN.

18. The method in 20, wherein said barrier layer prevents elements within said connector from diffusing to said internal components.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered

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therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 16 and 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar as applied to claims 17, 18, 20 and 22, and further in combination with applicant's admitted prior art.

As cited, Kumar teaches the following:

23. A method of forming a metallurgical structure, comprising: forming a first layer 14a on a substrate 10a; forming a barrier layer on said first layer; forming a second layer of copper 40 formed on said barrier layer; and forming a conductive structure 44 that includes a given species ["tin"], at least some of said given species diffusing from said conductive structure, said second layer of copper having a thickness sufficient to at least partially consume said species diffusing from said conductive structure, and to adhere to said conductive structure.

24. The method of 23, wherein said conductive structure comprises a solder ball.

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25. The method of 24, wherein said given species comprises tin.

26. The method of 24, wherein said solder ball comprises a lead/tin alloy.

27. The method of 24, wherein said barrier layer is selected from the group consisting of Ti, TiN, Ta, Tan, and combinations thereof

28. The method of 24, wherein said second conductive structure has an upper surface that is substantially coplanar with surrounding insulative structures 16a.

To further clarify the teaching of at least some of said given species diffusing from said conductive structure, said second layer of copper having a thickness sufficient to at least partially consume said species diffusing from said conductive structure, it is noted that at least some of said given species diffusing from said conductive structure is an inherent property of the process of Kumar. Also, the copper layer has a thickness, and it is inherent property of the process that the thickness is sufficient to at least partially consume the species diffusing from the conductive structure.

However, Kumar does not appear to explicitly teach the following:

16. The method in 20, wherein said same material comprises copper.

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Nor does Kumar appear to explicitly teach forming the first layer of copper.

Nonetheless, in the "Description of the Related Art," applicant teaches wherein internal components 13 comprise copper, and forming a first layer 13 of copper. In addition, it would have been obvious to combine the process of applicant's admitted prior art with the process of Kumar because it would provide internal components and a first layer.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar as applied to claims 17, 18, 20 and 22, and further in combination with Havemann (6156651).

As cited, Kumar teaches the following:

19. The method in 20, further comprising removing said integrated circuit structure such that said plug, said barrier layer and said exterior form a planar surface.

However, Kumar does not appear to explicitly teach polishing the structure.

Nevertheless, at column 5, lines 29-33, Havemann teaches a process comprising polishing an integrated circuit structure such that a plug, a barrier layer and an exterior form a planar surface.

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Moreover, it would have been obvious to combine the process of Havemann with the process of Kumar because it would enable the removing of Kumar.

Applicant's remarks filed 4-29-02 have been fully considered and rendered moot by the rejection supra.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to Group 2800 Customer Service whose telephone number is 703-306-3329.

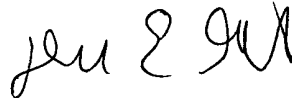
Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is 703/308-7722.

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A handwritten signature in black ink, appearing to read "David E. Graybill".

David E. Graybill
Primary Examiner
Art Unit 2827

D.G.
10-Jul-02